State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Waste Management Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404
802-241-3888
fax 802-241-3296

October 29, 1998

SHARON ABBOTT
JW SANDRI INC
PO BOX 1578
GREENFIELD MA 01302-1578

RE: Site Investigation Report for the Exit 4 Sunoco, Dummerston / SMS Site # 972278

Dear Ms. Abbott:

The Sites Management Section (SMS) has received Stevens & Associates Site Investigation Report for the Exit 4 Sunoco facility located in Dummerston, Vermont. This report summarizes the findings of the environmental work requested by the SMS in relation to the onsite gasoline release.

In general, the groundwater results indicate that a gasoline plume lies between the former tank and dispenser area and MW1 (downgradient well). MW 1 lies within 25 feet of the adjacent property owned by the State of Vermont, Agency of Transportation. In a telephone conversation with Steven Brackett, it is believed that this property is used by the AOT for the right-of-way along Interstate 91 and no receptors (ie. buildings or supply well) appear to be at risk. Both benzene and MTBE were detected in groundwater samples collected from MW1 at concentrations above the Groundwater Enforcement Standards. No petroleum contamination was detected in the onsite bedrock supply well.

Based on the findings, the SMS concurs that continued groundwater monitoring is warranted to track the contaminant plume. Please direct your consultant to commence a quarterly monitoring schedule by the end of **December 1998.** All groundwater (monitoring wells and drinking supply well) samples should be analyzed for volatile organic compounds by EPA Method 8021B-to include napthalene and the trimethylbenzenes (1,2,4 and 1,3,5). Prior to initiating this work, please have your consultant submit a work plan and cost estimate for the above. This is required if J.W. Sandri seeks Petroleum Cleanup Fund reimbursement for this work.

I look forward to working with you on the cleanup of this site. If you have any questions, then please feel free to contact me at 802-241-3897.

Sincerely,

Linda Elliott

Linda Elliott, Project Manager
Sites Management Section

c: Steven Brackett
Michael Morrisette, VT AOT

le:wp\sites\sunoco\wqupd.1098

Type of Submittal	Petroleum Reimbursement Fund Phase
___ Workscope/Budget _✓_ Technical Report ___ Reimbursement Request ___ Monitoring Result	___ Initial Response Action ___ Free Product _✓_ Site Investigation ___ Corrective Action Plan ___ Remedial Design Plan ___ Remedial Implementation/Operations/Monitoring

Site Investigation Report

Exit 4, Rt. 5, Dummerston
(VT DEC Site # 97-2278)

Latitutde 42 degrees, 58'
Longitude 72 degrees, 31' 15"
USGS Newfane Quad

Prepared For:
J.W. Sandri, Inc.
P.O. Box 1578
Greenfield, MA 01302-1578
Contact: Sharon Abbott
(800) 628-1900

Prepared By:
Stevens and Associates Engineering
28 Birge St.
Brattleboro, VT 05301
Contact : Steven L. Brackett
(802) 257-9329

Sept. 4, 1998

Recommended Risk Category		
___ 1. Immediate Human Health Risk (Impacted Water Well, etc.)	___ 4. Surface Water Impact (Actual Impact to Class B or potential Impact to Class B)	_✓_ 7. Alternate Water Available/Low level Groundwater Contamination (<1000 x VGES)
___ 2. Potential Human Health Risk (Residential well within 1000' or site within wellhead area)	___ 5. No Alternate Water Available/No Existing Wells in Area	___ 8. No VGES Violation/No Source Remaining
___ 3. Free Product or Source Hazard	___ 6. Alternate Water Available/High Level Groundwater Contamination (>1000 x VGES)	

STEVENS & ASSOCIATES
ENGINEERING
Civil, Environmental & Structural Engineering

EXECUTIVE SUMMARY

On Nov. 10, 1997 seven petroleum underground storage tanks were removed from this service station site. A Site Assessment Report prepared by J.W. Sandri of Vermont, Inc. indicated petroleum contamination of soil in the area from which the UST's had been removed. Based on this report Chuck Schwer of the VT DES, Sites Management Section, in a letter dated Jan. 22, 1998 requested that a Site Investigation be conducted to determine the degree and extent of contamination, to assess the associated risk to potential receptors, and to determine whether there is a need for long term treatment or monitoring of soil and/or groundwater at the site.

Stevens and Associates Engineering has conducted a Site Investigation of the Exit 4 site, the results of which are contained in this report. Based on this work SAE has reached the following Conclusions:

- The release of petroleum from one, or more, of the former UST's has contaminated the soil in the area in which the UST's were formerly located, and has contaminated groundwater in a near surface overburden aquifers.

- The onsite drinking water supply is a 300' bedrock well located downgradient from the former source and from the plume of contaminated groundwater. VOC's were not present in detectable quantities in a water sample collected from the source on Feb. 19, 1998.

No evidence was found to indicate that the soil and groundwater contamination identified is a threat to any other receptors.

In light of these Conclusions, SAE has the following Recommendations:

- Groundwater monitoring of MW-1, MW-2, MW-3 and the onsite drinking water source (hereinafter referred to as DW-1) should begin as soon as possible and should be conducted on a quarterly basis until information is collected which indicates that the scope or frequency of groundwater monitoring should be changed.

SITE INFORMATION

Tax Map #	Owner	Address	Phone
6-333	Sandri Realty Inc.	P.O. Box 1578 Greenfield, MA 01302	(800) 628-1900
State ROW: no tax map number	State of Vermont		

SITE HISTORY

Ownership History

7/6/76 to present	Sandri Realty, Inc.	Book 44, Page 296
9/25/68 to 7/6/76	Sun Oil of PA	Book 40, Page 489
4/2/66 to 9/25/68	Pelm Corp.	Book 40 Page 1
7/22/54 to 4/2/66	Russel and Hilda Howard	Book 35, Page 59

Hazardous Materials Use, Storage and Disposal Practices

The site has been used as a retail gasoline station, automotive service station and a convenience store since 1966. There is no evidence to indicate that past or present hazardous materials use, storage, or disposal practices have been improper.

Known Hazardous Materials Releases

There is no formal record of prior hazardous materials releases at the site.

MAPS

A tax map which shows the location of the source and the locations of any potential receptors is contained in the Appendix.

USGS Map - see Appendix

Site Plan - see Appendix

RECEPTORS

	Yes	No	Notes
Wellhead Protection Areas	X		See Below
residential wells		X	
surface waters		X	
buildings with basements		X	

wetlands	X
ecologically sensitive areas	X
areas of direct soil contact	X
utility corridors	X

Wellhead Protection Areas - While a WHPA has not been defined for the onsite drinking water source, if VT ANR methodology for defining a "well shield", or isolation zone, for a Public non-community well were applied in this case, then the area of contamination would lie within the "well shield".

GEOLOGY

Soil Type - Soils observed during the installation of the three monitoring wells, as well as during the excavation of the seven former UST's, were gravel from the surface to a depth of approximately 3' and then varved clay to the deepest depth penetrated (42' in MW-1). Many of the varves contained silt and fine sand interbeds permeable enough to readily allow water flow.

Bedrock Type - The bedrock geologic map contained in "Bedrock Geology of the Brattleboro Quadrangle, Vermont-New Hampshire" Hepburn et al , 1984 indicates the bedrock below the Exit 4 site to be Silurian age Gile mountain formation. The Gile Mountain consists of interbedded quartzite and gray mica phyllite and schist. According to the drillers log from the onsite water source bedrock is approximately 80' below grade.

HYDROGEOLOGY

Depth to GW	GW Flow Direction	Hydraulic Gradient	Estimated K
26'	east southeast	5%	in varves 10^{-5} feet/sec

MONITORING WELLS

Monitoring Well Installation Procedure

Soil Boring Installation - Soil borings were installed by T+K Drilling using an Acker soil boring rig and 4." hollow stem augers. If borings were refilled they were grouted at the surface.

Monitoring Well Construction - Monitoring wells were constructed by installing 2" Sch 40 PVC machine slotted screen and solid riser, in appropriate lengths into 4.5" soil borings. The annulus was filled with sorted filter sand to a depth of between .5' and 1' above the top of the screen. A bentonite seal of at 1' thick was placed on top of the filter sand, and then the balance of the annulus was filled with native soils. A locking cap was installed in the top of the 2" PVC riser and a 8" aluminum road box was installed flush with the ground surface.

Sample #	Sample Description	Field Screening Result (ppm)
1-1	15'-17'; 1,1,2,2 grey clay	0
1-2	20'-22'; 1,1,1,1 as above	0
1-3	25'-27'; 1,1,1,1 as above	0
1-4	30'-32'; 1,1,1,1 as above; slight smell	55
1-5	35'-37'; 0,1,3,5 as above with bottom 6" brown clayey silt, wet	0
1-6	40'-42'; 0,0,3,5 dark brown silty very fine sand	0
2-1	15'-17' 1,3,3,3 olive brown clay	12
2-2	20'-22' 0,1,1,3 as above	3
2-3	25'-27' 0,1,1,3 as above	0
2-4	30'-32' 1,1,2,3 olive brown silt	0
3-1	10'-12' 1,2,2,3 olive brown clay	0
3-2	15'-17' 0,1,1,2 grey clay	0

PLUME DEFINITION

Extent of Plume - The groundwater contamination found in MW-1 indicates that the plume extends to at least 60' to the southeast from the former location of the gasoline UST's and the gasoline dispenser islands. MW-2 indicates that the plume is probably not more than 40'- 50' wide at its widest point.

Migration Pathways - Virtually the only migration pathway available at this site are the varves within the dense, massive clay overburden. As sample # 1-5 and 1-6 show these varves at times can consist of fairly porous and permeable silts and even fine sands. Although the character of the varves can change somewhat with distance they do persist for long distances and have been used for many years to correlate soil sections throughout the Connecticut River Valley.

Utility corridors are not likely to influence contaminant migration at this site. There are buried water and electrical lines in the area of the plume but all of these are less than 6' deep while the groundwater is approximately 26' deep.

FREE PRODUCT

	Thickness	Volume Recovered	Thickness	Volume Recovered	Thickness	Volume Recovered	
	6/17/98						

MW-1	none						
MW-2	none						
MW-3	none						

CONTAMINANT FATE AND TRANSPORT

Rate of Migration

A seepage rate of 1.1 ft/day has been calculated as follows:

hydraulic conductivity = 5×10^{-5} ft/sec
porosity = 35%
hydraulic gradient = 9%

S = 5*10-5*.09/.35
S = 1.11 ft/day

Potential for Natural Attenuation - Dissolved Oxygen levels were recorded in the field for the groundwater samples which were collected from MW-1, MW-2 and MW-3. The results are presented in the table below.

	MW-1	MW-2	MW-3
DO level (mg/L)	2	6	14

As these numbers show the DO levels are quite depressed in the area of the plume. This clearly indicates that the oxygen demand is outstripping supply and consequently slower anaerobic degradation is occurring at the site. It is likely that the rate of natural attenuation will be fairly slow at this site.

SAMPLING PROCEDURES

Soil Sampling - Soil samples were collected at intervals of no greater than five feet. Samples were collected at changes in lithology, at the water table and from any portion of the core which seemed to be stained. Samples were collected using a 2' diameter 24' split spoon sampler.

Field Screening- Field screening of soil samples for VOC's was conducted using a Gastech OVM Model 1314 calibrated to 400 ppm hexane. The OVM was calibrated on the day of use, both before and after field screening was conducted. Soil samples were placed in wide mouth glass jars, the mouths of which were then covered with aluminum foil. The sample jars were warmed to a consistent temperature as close to 70 degrees F as possible. The concentration of VOC's in the jar's headspace was then determined by inserting the probe of the Gastech© OVM through the aluminum foil membrane.

Groundwater Sampling - All monitoring wells were developed, and water samples collected using 2" diameter single check valve disposal bailers.

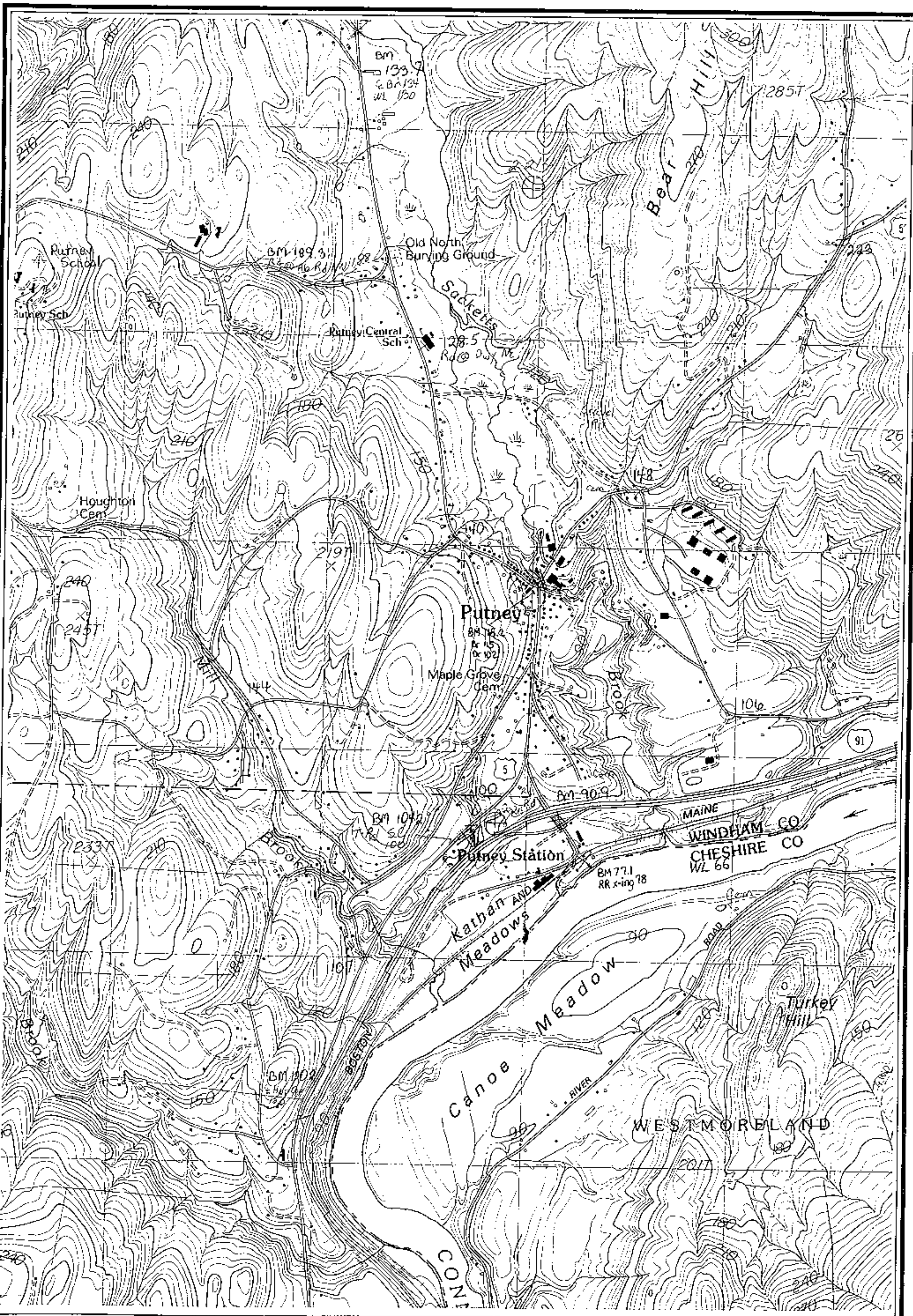
Groundwater Gauging - Groundwater elevation was measured from the ground surface using a Roctest© Water Elevation Meter. The meter has a probe attached to the end of a measured cable. The probe was lowered into the well and at the point that the probe reached groundwater an electric circuit was closed and a high frequency tone was emitted from the meter at the surface. The cable was marked in .01' increments.

INTERPRETATION OF LABORATORY RESULTS

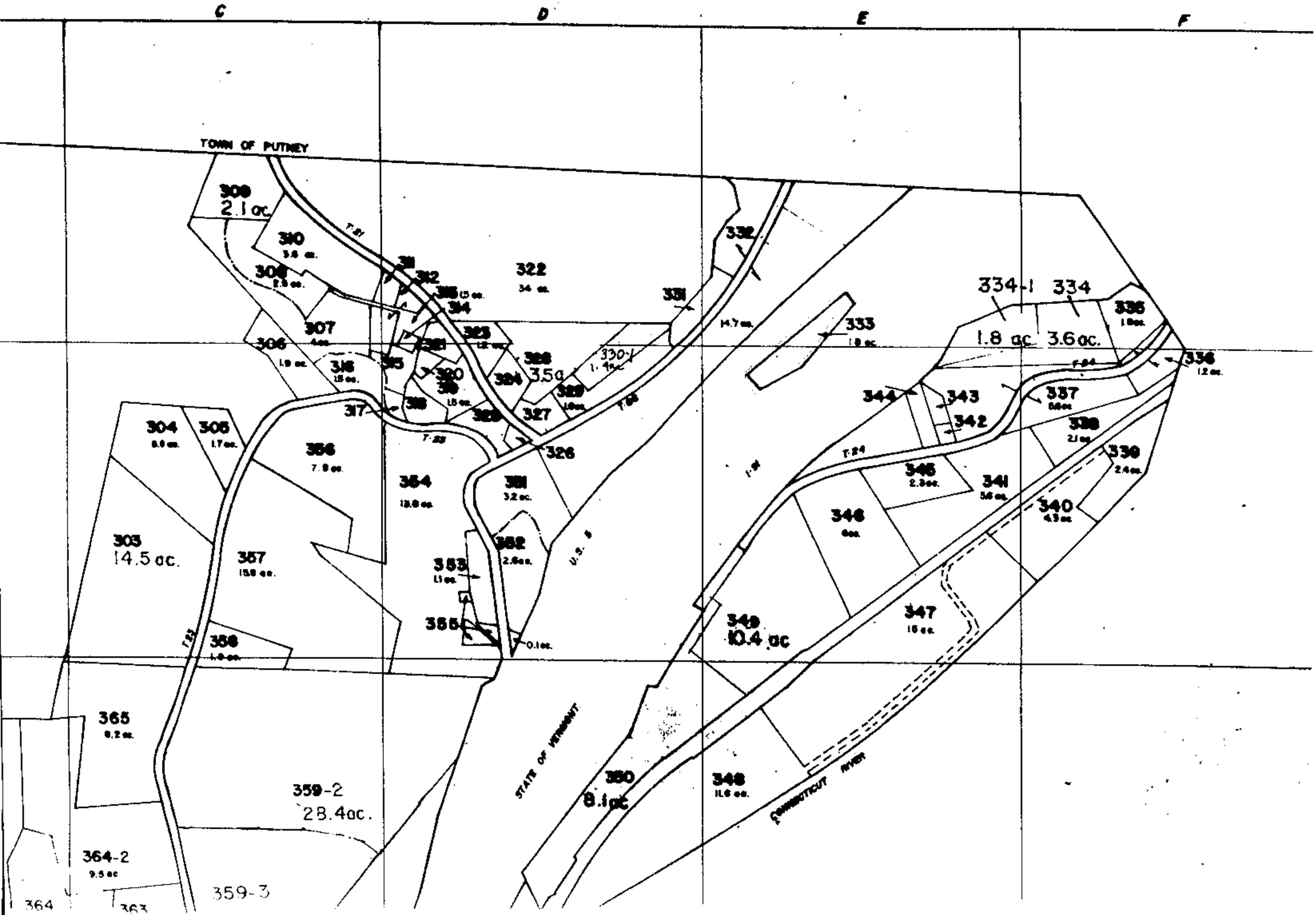
The groundwater analytical results for the 5/28/98 round of groundwater monitoring are contained in the table below. The table also contains results for a sample collected from DW-1 on Feb. 19, 1998.

	benzene	toluene	ethylbenzene	xylene	MTBE	naphthalene
MW-1	140	40	10	40	200	< 10
MW-2	< 1	< 1	< 1	2	20	< 1
MW-3	< 1	< 1	< 1	< 1	< 10	< 1
DW-1	< 1	< 1	< 1	< 1	< 1	< 1

MW-1 is located downgradient from both the former location of the gasoline UST' s which were removed on Nov. 10, 1997, as well as from the gasoline dispensers. The presence of benzene and MTBE are consistent with gasoline contamination.



Putney School
Putney Sch
Old North Burying Ground
Sacketts
Putney Central Sch
Bear Hill
Houghton Cem
Putney
Maple Grove Cem
Mill
Brook
Putney Station
Kathan
Meadows
MAINE
WINDHAM CO
CHESHIRE CO
Canoe Meadow
RIVER
ROAD
Turkey Hill
WESTMORELAND
BOSTON
CONN
BM 90.9
BM 77.1
BM 104.2
BM 189.3
BM 120.2
285T
245T
233T
219T
201T


C
D
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TOWN OF PUTNEY
309
2.1 ac.
310
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3.5 a
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330-1
331
332
333
334-1
334
1.8 ac.
3.6 ac.
335
336
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343
344
345
346
347
348
349
10.4 ac
350
8.1 ac
351
352
353
355
356
357
358
304
305
303
14.5 ac.
365
364-2
359-2
28.4 ac.
359-3
364
363
STATE OF VERMONT
CONNECTICUT RIVER
U.S. 5
I-91
T-24

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 12679

Client: Stevens & Associates

Client Designation: Exit 4/Exit 1 VT

Volatile Organic Compounds

Client ID:	SAN 4.1	SAN 4.2	SAN 4.3	SA[redacted].1
Matrix:	aqueous	aqueous	aqueous	aq[redacted]us
Date Received:	5/29/98	5/29/98	5/29/98	5/[redacted]98
DateAnalyzed:	6/4/98	6/5/98	6/5/98	[redacted]98
Analyst:	VG	VG	VG	[redacted]G
Units:	ug/L	ug/L	ug/L	[redacted]/L
Method:	8021	8021	8021	[redacted]1
Dilution Factor:	10	1	1	[redacted]0
MTBE	**200**	**20**	< 10	37[redacted]0
Benzene	**140**	< 1	< 1	[redacted]0
Toluene	**40**	< 1	< 1	2[redacted]0
Ethylbenzene	**10**	< 1	< 1	[redacted]0
m,p-Xylene	**40**	< 1	< 1	[redacted]
o-Xylene	< 10	**2**	< 1	[redacted]
Naphthalene	< 10	< 1	< 1	< 100

Approved By Clifford Chase, Volatile Organics Supervisor _____ 6/12/98

eastern analytical, inc. 25 Chenell Drive / Concord, NH 03301 / TEL (603) 228-0525 / 1-800-287-0525
FAX (603) 228-4591 / E-Mail : front_office@eailabs.com

12679

CHAIN-OF-CUSTODY RECORD

REQUESTED ANALYSES

ITEM # for lab use only	SAMPLE I.D.	SAMPLING DATE / TIME	MATRIX A - Air, S - Soil, GW - Ground Water, SW - Surface Water, DW - Drinking Water, WW - Waste Water, ☐ Other	G-Grab, C-Comp	☐ 524.2 ☐ 8260B	TICs	☐ 8021B ☐ 8260B-TCL (8240) ☐ 624	☐ 8021B-Halos (8010) ☐ 601	☑ 8021B-BTEX (8020) ☐ 602	☐ MA VPH ☐ 8015 ☐ ME GRO	☐ MA EPH ☐ Without Targets ☐ ME DRO	TPH 8100 MOD ☐ LI ☐ LII ☐ LIII	☐ 8270 ☐ ABN ☐ 625 ☐ A ☐ BN ☐ PAH	☐ 8080 ☐ PCBs ☐ 608 ☐ Pesticides	Metals (list below) Total	Metals (list below) Dissolved	Metals (list below) ☐ TCLP ☐ EPTOX	☐ TSS ☐ TDS ☐ TS	☐ F ☐ Cl ☐ SO₄ ☐ NO₂ ☐ NO₃	☐ pH ☐ Spec. Con. ☐ BOD	☐ T. Alk ☐ Carb. Alk ☐ Bi. Alk	☐ TKN ☐ NH₃ ☐ T. Phos.	☐ COD ☐ TOC ☐ Phenols	☐ Oil & Grease ☐ TPH 418.1	☐ CN ☐ Formaldehyde	☐ T. Coli ☐ E. Coli ☐ F. Coli ☐ F Strep					# Of Containers	NOTES
1	SAN4.1	5/28/98	GW	G					X																						2	✓
2	SAN 4.2	"	"	G					X																						2	✓
3	SAN 4.3	"	"	G					X																						2	✓
[redacted]																															2	✓
Low level detection limits (check if needed and list in notes)																																
PRESERVATIVE : H-HCl ; N-HNO₃ ; S-H₂SO₄ ; Na-NaOH																																

PROJECT MANAGER : Steven Brackett
COMPANY : Stevens & Associates
ADDRESS : 28 Birge St.
CITY : Brattleboro STATE VT ZIP 05301
PHONE : (802) 257-5329 EXT :
FAX : 802 258-3892
E-MAIL : bstevens@sover.net
PROJECT I.D. : Exit 4 / Exit 1
STATE: ☑ NH ☐ OTHER VT
☑ Site historical[illegible]ntaminated ☐ Compliance Testing

RESULTS NEEDED BY
(enter preferred date) : ________
(Guaranteed rapid turnaround must have pre-approval)
NOTES : (i.e. Special Detection Limits, Billing Info. if different)
Please analyze each sample for BTEX, MTBE and naphthalene

① 1 vial for .02 has SAN4.1 as I.D. on label. Time agrees w/SAN4.2 label.

QA / QC Reporting Level
☐ A ☐ B ☐ C

Reporting Options
☐ Hard Copy
☐ Fax
Electronic :
☐ E-Mail ☐ Disk

FOR LAB USE ONLY
Custody Seal Intact ? ☐ Yes ☐ No
Cold ? ☒ Yes ☐ No

Quote # ________
P.O. # ________
Sampler(s) S. Brackett

Relinquished by	Date	Time	Received by
[signature]	5/28/98	12:15	[signature] 5/29/98 1045

(WHITE : *Original* YELLOW : *Lab Fi[le]* PINK : *Project Manager*)

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number:	L9801204-02	**Date Collected:**	19-FEB-98
	238-LA	**Date Received :**	19-FEB-98
Sample Matrix:	WATER	**Date Reported :**	03-MAR-98
Condition of Sample:	Satisfactory	**Field Prep:**	None

Number & Type of Containers: 1 Vial

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATES PREP	DATES ANALYSIS	ID
Aromatic Volatile Organics				6	602		21-Feb	NL
Benzene	ND	ug/l	1.0					
Toluene	ND	ug/l	1.0					
Ethylbenzene	ND	ug/l	1.0					
Xylenes	ND	ug/l	1.0					
1,2-Dichlorobenzene	ND	ug/l	1.0					
1,3-Dichlorobenzene	ND	ug/l	1.0					
1,4-Dichlorobenzene	ND	ug/l	1.0					
Chlorobenzene	ND	ug/l	1.0					
Methyl tert butyl ether	ND	ug/l	1.0					
Naphthalene	ND	ug/l	1.0					

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA
Analytical Laboratories, Inc.

Eight Walkup Drive
Westborough, MA 01581-1019
508-898-9220 FAX 508-898-9193

CHAIN OF CUSTODY RECORD and ANALYSIS REQUEST RECORD

No. 86041
Sheet 1 of 1

Company Name: A.R. SANDRI, INC.

Project Number: 238

P.O. Number:

Project Name / Location: PUTNEY

Date Received in Lab: 2/19

Date Due: 3/5

Company Address: P.O. BOX 1578, Greenfield, MA 01302-1578

Phone Number: 1-800-628-1900

FAX No.: 413-773-5049

Project Manager: SHARON ABBOTT

Alpha Job Number: (Lab use only) 9801204

Container Codes: P = Plastic V = Vial C = Cube G = Glass A = Amber Glass B = Bacteria Container O = Other

MATRIX / SOURCE CODES: MW = Monitoring Well, RO = Runoff, O = Outfall, W = Well, L F = Landfill, L = Lake/Pond/Ocean, I = Influent, E = Effluent, DW = Drinking Water, R = River Stream, S = Soil, SG = Sludge, B = Bottom Sediment, X1 = Other, X2 = Other

ALPHA Lab # (Lab Use Only)	Sample I.D.	Containers (number/type)	Matrix / Source	Method Preserve. (number of containers): Unpres.	Ice	Nitric	Sulfuric	HCl	Other	Solubles - F.F.	Sampling Date	Sampling Time	Analysis Requested
1204.1	238-1	1/V	DW					1			2/19/98	8:30	8015
.2	238-1A	1/V	DW					1			↓	↓	8020
.3	238-2	1/V	DW					1					8015
.4	238-2A	1/V	DW					1					8020
.5	238-TB	1/V						1			2/13/98	10:00	TRIP BLANK

Sampler's Signature: Sharon E. Abbott / Affiliation: A.R. Sandri, Inc. / Date: 2/19/98 / Time: 8:40

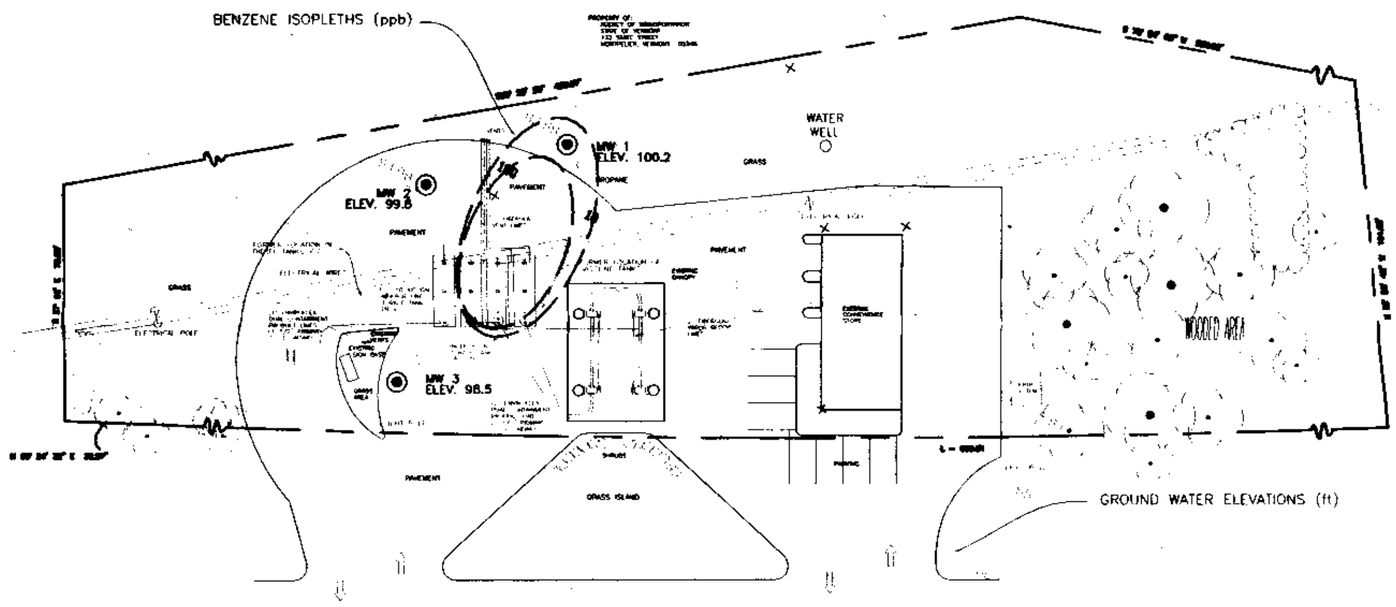
ADDITIONAL COMMENTS:

NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1	Sharon E. Abbott	Lynn Monahan	2-19	12:00
2	Lynn Monahan	[signature]	2/20/98	1635
3				
4				

Form No. QOP/06-03

LEGEND

	EXISTING
CATCH BASIN	C.B.
DRAIN MANHOLE	MH
SEWER MANHOLE	SMH
WATER VALVE	
IRON PIN FOUND	
MONUMENT FOUND	
SIGN POST	
UTILITY POLE	
LIGHT POLE w/ CONC. BASE	
HYDRANT	
ENTRY	
INDEX CONTOURS	95
INTERMEDIATE CONTOURS	99
MONITORING WELL	
OVERHEAD UTILITY	OHU
WATER	W
DRAINAGE	D



U.S. ROUTE 5

GRAPHIC SCALE: 1" = 40'

GENERAL NOTES:

1. DWG PREPARED BY SANDRI P.O. BOX 760 GREENFIELD, MA. 01302
2. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY EXACT LOCATION OF ALL UNDERGROUND UTILITIES.

LOCUS

LOCATION PLAN

STEVENS & ASSOCIATES
ENGINEERING
Consulting in Civil, Sanitary & Structural Engineering
28 Birge Street, Brattleboro, VT 05301 (802) 257-9329

EXIT FOUR SUNOCO
ROUTE 5
PUTNEY, VT.

J.W. SANDRI OF VERMONT, INC.
P.O. BOX 1578
GREENFIELD, MA. 01302

DATE:	REVISION:

EXISTING SITE PLAN

DES. BY	SB
DWN. BY	PRP
CHKD. BY	
SCALE	1"= 40'
DATE	9/10/98
PROJECT NO.	98-007
DWG. NO.	C-1